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AMENDMENT UNDER 37 C.F.R. §1.115

spindle and having a plurality of brushes which rotate along a predetermined path together with said throttle valve spindle;

a circuit board having a plurality of resistors mounted thereon for contact with said plurality of brushes and located on a plane substantially perpendicular to the axial direction of said throttle valve spindle; and

a housing holding said circuit board and having a lead frame and a connector for transmitting an electric signal of said resistors, said housing being detachably fixed to said throttle body.

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amend
7
10. A contact type throttle sensor as in claim 6 wherein said at least two adjustment slots comprise unloaded holes.

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11. A contact type throttle sensor as in claim 1 wherein said circuit board is ceramic.--

R E M A R K S

Reconsideration and withdrawal of the outstanding rejections are respectfully requested in light of the above amendments, the new claim presented and the following remarks.

The specification has been amended to correct various minor informalities.

The present invention provides an advantageous contact type throttle sensor including throttle valve spindle 2, holder 6, circuit board 8, housing 12 and adjustment slots 14 for adjusting the position of resistors 9 with respect to brushes 7. Brushes 7 are mounted on holder 6, which is connected to throttle valve spindle 2. The circuit board 8 includes resistors 9, which contact brushes 7. The resistors transmit a continuous electric signal corresponding to the rotational angle of the throttle valve spindle.

The present invention eliminates bearings by locating brushes 7 on holder 6, which is mounted directly on the end of throttle valve spindle 2, and locating resistor 9 on housing 12. Therefore, the number of components is also significantly reduced and the structure of the sensor is simplified. The positions of resistors 9 are adjusted with respect to brushes 7 by rotating housing 12 by adjustment slots 14. The change of position changes the electric signal transmitted to connector 11.

As illustrated in Fig. 1 and described in the specification at page 5, first full paragraph, the holder, the recess and housing prevent vibration from disturbing the contact between the brushes and the resistors. The vibrations are dampened by the massive housing and holder.

Claims 1-7 have been amended and claims 8-11 have been introduced to provide a more complete scope of protection for the features of the invention.

Turning now to the art rejections, claims 1-6 were rejected under 35 USC §103 as being unpatentable over the patent to Eguchi in view of the patent to Minagawa. Claim 7 was rejected under 35 USC §103 as being unpatentable over Eguchi in view of the patent to Minagawa and the patent to Overcash.

It is submitted that the patents to Eguchi and Minagawa do not disclose or suggest the presently claimed invention.

The patent to Eguchi does not disclose or suggest the presently claimed invention including the adjusting means. The patent to Eguchi in Figs. 1 and 3A discloses slots 210 and screws 3 for fastening enclosure 2 to throttle body 1. However, the position of permanent magnets 16 and yoke 15 does not change with respect to magnetic sensing element 22 as magnetic sensing element 22 appears to be located in the center of enclosure 2. If enclosure 2 is rotated, magnetic sensing element 22 rotates, and the position of magnetic sensing element 22 does not change with respect to permanent magnet 16 and yoke 15. In contrast, the presently claimed invention

includes adjusting means for adjusting a position of the resistor with respect to the brush.

The patent to Eguchi does not disclose or suggest the presently claimed invention including the resistor of claim 1 or the resistors of claim 9. The patent to Eguchi at col. 2, lines 60-65 discloses a ferromagnetic metal type magneto-resistive element whose resistance is varied anisotropically in dependence on an angle formed by the direction of the magnetic field and the direction of the current flow. As illustrated in Fig. 3 and claimed in independent claims 1 and 9, resistors 9 do not vary resistance in dependence on the angle formed by the direction of the magnetic field and the direction of the current flow. If the magneto-resistive element was substituted for the resistors as suggested by the Office Action, the presently claimed invention would not function as intended. Thus, the patent to Eguchi in no way discloses or suggests the presently claimed invention including the resistor of claim 1 or the resistors of claim 9.

It is submitted that the patent to Eguchi in no way relates to the present invention of a contact type throttle sensor. The patent to Eguchi relates to a magnetic field generating source disposed on one end of the rotating member to generate a magnetic field. A magnetic sensing element

generates an output signal which varies in dependence and direction of the magnetic field. Eguchi discloses at column 3 line 46 that this invention is of the non-contacting type. In contrast, the presently claimed invention includes a contact type throttle sensor.

The patent to Minagawa discloses holes 23 for fitting sensor 1 to throttle body 14. The position of brushes 6 does not change with respect to plate 7 regardless of the position of sensor 1. As illustrated in Fig. 6, as brushes 6 and plate 7 are both located in sensor 1, both the brushes 6 and the plate 7 move together as the sensor is moved. If sensor 1 is rotated, both brushes 6 and plate 7 move together. In contrast, the presently claimed invention includes adjusting means for adjusting a position of the resistor with respect to the brush as defined in independent claim 1. Of course, the above arguments are equally valid for the adjusting means as defined in independent claim 9.

The patent to Overcash does not disclose or suggest the presently claimed invention including the adjusting means. The Office Action alleges that the patent to Overcash discloses the use of conductive plastic resistive material. The patent to Overcash discloses in Figs. 6 and 7 wiper contact 66, which engages conductive material 74 to provide a movable electrical

contact with the resistive element 72. Figs. 6 and 7 additionally illustrate mounting apertures 18, 20 for securing the assembled position sensor in its proper location on the carburetor. As can be seen in Fig. 3, mounting apertures 18, 20 do not provide for adjustment between wiper contact 66 and resistive element 72 or conductive material 74. Thus, Overcash in no way discloses or suggests the presently claimed invention including the adjusting means.

It is submitted that neither the patent to Eguchi nor the patent to Minagawa discloses or suggests the presently claimed invention including the holder and the housing as defined in independent claim 9. It is noted that both, the patent to Eguchi and the patent to Minagawa, were assigned to Nippondenso Co., Ltd. The present invention includes the resistor and brush mounted directly on the throttle spindle. The earlier patent to Eguchi does not disclose resistors; the later patent to Minagawa discloses a throttle valve position sensor including a rotary shaft 4 as illustrated in Fig. 4. The fact that the rotary shaft 4 was included in Minagawa is evidence that to mount the brushes on the holder to contact the resistor mounted on the housing without a shaft or bearing is unobvious. Thus, neither Eguchi nor Minagawa discloses or suggests the

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presently claimed invention including the holder and the housing as defined in independent claim 9.

Due to the above-noted claimed subject matter and advantages, it is submitted that claims 1-11 are allowable over the combined teachings of the applied art.

In light of the above, it is respectfully submitted that the present application is in condition for allowance and notice to that effect is respectfully requested.

To the extent necessary, applicants petition for an extension of time under 37 C.F.R. §1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, Deposit Account No. 01-2135 (Case: 520.29337X00) and please credit any excess fees to said deposit account.

Respectfully submitted,

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